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SHORELINE SURVEY

A STREAM TEAM MONITORING PROJECT

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Second Edition, 1994

Prepared by
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Assisted by
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Karen I. Pelto, Stream Ecologist

Massachusetts Riverways Programs, Department of Fisheries, Wildlife and Environmental Law Enforcement
100 Cambridge Street, Boston, MA 02202

John C. Phillips
Commissioner

Trudy Coxe
Secretary of Environmental Affairs

William F. Weld
Governor

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Commonwealth of Massachusetts

Riverways Programs

July, 1994

Dear Shoreline Survey Stream Team,

Congratulations on becoming part of the Stream Team Project in your watershed! Using the Shoreline Survey, you can observe and record stream conditions on data sheets and maps. The Survey, designed to be conducted by lay people, provides Information about the current conditions of your river and its corridor. Without your participation, this baseline Information will not be available for your group, the town and state agencies. Information from a Shoreline Survey can be used as evidence to help protect your river from continued pollution from pipes, prevent destruction of habitat and siltation of fish spawning areas, and protect adequate flow for the river.

People who participate in Shoreline Surveys are looking for the vital signs of the river. As we participate, we learn to read a river, from human eyes, and from the eyes of wildlife and on behalf of the river itself. We learn what the river needs to be healthy, and we learn to spot threats to the river. The river is a reflection of the adjacent land use and surround watershed.

Groups have used the information from Shoreline Surveys to

- •raise citizen consclousness about the river
- •increase landowner understanding about stewardship of private land next to the river
- •ensure that illegal hookups to the river are discontinued
- •inform state officials of the presence of water-dependent species and habitat which will be considered as part of the water withdrawal permitting process
- •report problems to local town boards so that they can work to correct abuses
- •begin a habitat assessment and restoration program
- •design a water quality monitoring program
- •create clean ups in needed areas and
- •create canoe access areas and tralls.

In sum, the Shoreline Survey allows you to prioritize your work based on field observations of the river. It gives you information to educate your community and, as part of the EOEA State Agencies initiative for a watershed-wide approach to resource protection, expand their database with volunteer observations.

This guide to Shoreline Surveys is a compilation of information gained from working with groups across the Commonwealth. In addition, we have included information from EPA Region 10, Salt Pond Watchers, Save the Bay, R.I, the Westport River Watershed Alliance and the Pokanoket Watershed Alliance. Your group needs to pick and chose and substitute what will work on your river. As we learn from you and other groups, we will update this information.

We support your work, and we hope that you will keep in touch with us as you do your Shoreline Surveys (617-727-1614 X 384). We can help with regional workshops, with materials and with networking with other groups that have conducted Shoreline Surveys.

Sincerely,
Riverways Program Staff
Joan Kimball, Adopt-A-Stream Coordinator
Maria Van Dusen, Riverways Program Coordinator
Karen Pelto, Stream Ecologist
Russell Cohen, Rivers Advocate
Correigh Green, 1991 Riverways Intern
Peter Bonome, 1993 Riverways Intern

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Introduction to the Shoreline Survey

The Adopt-A-Stream Program of the Massachusetts Department of Fisheries, Wildlife, & Environmental Law Enforcement has developed the Stream Team Approach to river watching in response to local concerns for the health of rivers and river resources. Residents of various towns have called and asked us to help them follow up on abused areas adjacent to the river. Reports include dumped tires, fish kills, accumulation of litter and debris, discolored water near landfills, runoff from parking lots and sediment from bridges. People are concerned about possible pollution in rivers, and they want to help.

What is the purpose of Shoreline Surveys?

The overall purpose of a Shoreline Survey is learn about the river in order to protect it. Through the Survey, you will be able to determine some of the vital signs of a river, report immediate problems to proper authorities, and prioritize both short term and long range work that needs to be done.

Some objectives of Shoreline are: gathering baseline data, designing a water quality monitoring program, finding causes of high coliform counts, tracking polluted runoff from stormwater pipes, or from farms or from new construction, planning habitat protection or restoration and promoting citizen awareness. Each group must decide which objectives best serve the river.

How do you do a Shoreline Survey?

Groups divide the river into reasonably sized segments and walk or canoe each segment. The choice of walking or canoeing often depends upon the conditions on the river. Some river banks are impenetrable because of vegetation or the attitude of the owner. When a river is suitable for canoeing, groups can avoid requesting landowner permission to cross private property, but they still should invite the landowners to join them as part of an important constituency-building process. If neither walking the shores nor canoeing is possible, groups must rely on bridge crossings and views from roads.

Volunteers in pairs, or, in canoes, in threes with a non-paddling note taker, note their observations on the data sheets, take photographs, and identify key areas on their maps. This Shoreline Survey guide contains data sheets which you can use or modify to fit your river. In addition, this guide consists of instructions, samples of work, descriptions and photographs of what you will see, and background information.

When should you do a Shoreline Survey?

Shoreline Surveys can be done any time in your river protection work. Some groups conduct them in the beginnings as a planning tool; others at midpoint as follow up to pinpoint sources of pollutants or to gauge success of clean ups or restoration projects, and some conduct them regularly to see seasonal and yearly differences. You can do shoreline surveys at different times of year. Many groups like to do Shoreline Surveys when the leaves are off the trees so that the river bank is more visible. However, in spring and fall, groups should avoid walking on the stream bed because fish may be spawning.

What can you do with the data from a Shoreline Survey?

Baseline data will allow your group to keep tabs on the health of the river. Observers fill out the data forms consisting of observations and summaries of each section. The summaries form the basis of a report on the health of the river to share the public and local officials and raise awareness about the activities that could be affecting the river. Section III, Taking Action, describes what you can do with the data. This work includes using the data and maps to design an effective water quality monitoring program, and using it to help state agencies as they work to improve water quality on a watershed wide basis by conditioning discharges and water withdrawal permits.

Section I. Preparing for a Shoreline Survey

Shoreline Surveys are more effective if your group has thought about the purposes of the survey for your river, and prepared the volunteers for their work. Talking about the purposes and writing them down is an essential step. Volunteers feel more empowered if they know that the data will be used and that their work will help the river.

A. Setting Goals:

As your group plans a Shoreline Survey, you all need to think about

1) why you are doing a Shoreline Survey
2) what you plan to achieve
3) what you will do with the data you collect

Why? Clearly specify and WRITE DOWN the reasons for conducting a Shoreline Survey. For example, your group may want to:

--protect fish & wildlife around the stream
--determine the impact of new development along the river
--assess the effectiveness of specific clean up efforts
--build an informed constituency for stream protection
--collect baseline data to promote better local and state planning for stream protection & restoration
--determine the impact of point and non-point pollution

What do you plan to achieve? Clearly specify and WRITE DOWN the outcomes that the program is designed to achieve. For example, you may want to:

--educate public officials & local residents & businesses
--restore the quality of the stream for specific recreational and natural purposes
--stop inappropriate development and work with town officials to ensure that proper siting and buffering occurs with new developments
--identify effective cleanup strategies
--assess water quality of stream areas used for water supply, recreation, or by sensitive aquatic species
--locate good fisheries habitat & stream restoration sites

What are you going to do with the data you collect? Clearly specify the frequency and ways in which monitoring data are to be used. For example:

--create a report on the health of the river, share it with your members and town officials and publish it in the newspaper
--design a water quality monitoring program
--alert environmental officials to potential pollution violations
--submit data for inclusion in a statewide stream monitoring database (to be developed)
--protect and restore aquatic habitat

B. Recruiting Volunteers and Sharing the Work

Some watershed associations, fishing groups, and neighborhood groups have found that a variety of people want to be involved in Shoreline Surveys. The Surveys provide people with an opportunity to be out on the river or river banks, learn about the river, and contribute to its protection. Some groups advertise a meeting in the newspaper or in their newsletters; others call prospective volunteers on the phone. You may be surprised at the number and range of volunteers you hear from; people volunteer to do Shoreline Surveys who would never go to an indoor meeting. Regardless of your recruitment methods, be sure that town residents and riverfront landowners feel included.

You do not need vast numbers of volunteers. Estimate the number of volunteers needed by dividing your river frontage into reasonable segments (a half a mile, a fourth of a mile--depending upon the river). Each segment requires at least two people. To determine reasonable lengths of each segment, consider how difficult the river is to walk or canoe and how many pipes or other factors need to be observed. In addition to surveyors, you will need people to coordinate the Shoreline Survey.

Some groups have created a steering committee to run the event. This committee can be comprised of a few key people who are doers. Other groups have organized by dividing the river into large stretches and having team leaders for each stretch divide up the work, gather maps, inform landowners and recruit volunteers for their sections. Volunteers can be asked to find friends to come along. Invite members of town boards, the League of Women Voters, garden clubs, angers and sportsmen, canoeists, business clubs and land trusts.

We recommend that each task have two people (or more) to share the workload. Some of these tasks may need a committee of several people. By involving several people, each task is more fun and is less likely to result in volunteer burnout. Tasks for a Shoreline Survey generally include:

- Overall Coordination: This committee oversees the project from beginning to end and makes sure that the steps are taken. This committee could also do the follow up work.

- Volunteer Coordination: This committee ensures that there are enough volunteers and that they know what to do.

- Public Relations Coordination: This committee writes letters to landowners and sees that they are distributed , writes press releases and articles in your newsletter if you have one, talks to Cable TV, radio, invites other organizations, etc. This committee can help with follow up publicity as well.

- Materials Coordination: This committee gets baseline maps, sees that handouts and maps are photocopied, and organizes canoes if necessary.

- Follow up Coordination: This committee works to get a summary report written, reviews the summaries and data sheets, makes a base map to accompany the report and works with the group to determine which steps need to be taken immediately and to begin long range planning.

C. Creating the Maps:

Groups have used a variety of base maps for Shoreline Surveys. We have included a description of some of the more available maps.

To obtain information about your Shoreline Survey area, find a USGS topographical (topo) map of your area. The "topo" maps are excellent in that they show buildings, elevations, waterways and roads. We recommend a 7 1/2 minute quad map (a 1:24,000 map where 11 inches = 4 miles). They are available at local sporting goods stores. By enlarging (200% to a scale of 1" = 1000 feet) on a copy machine, you will have a map that is easier to read and manage. When you photocopy and enlarge the map, be sure the enlarge the scale bar so that the new scale is shown.

A topo map can be used to choose segments and as a reference for follow up. It can also be used as a template to trace in making an accurate sketch map of your stream segment. A marked copy of your sketch map and data sheets will make follow up easier. They can be used to identify exact locations in the field and for entering you data into a data management system.

Groups have also used zoning maps and assessors maps. For a fee, town halls will often copy maps for you or allow you to make copies. When deciding on a map, it is important that the maps be usable in the field. People must be able to use them to know exactly where they are. Make a trial visit to the river with one of the maps. Can you find your location with ease (even if you are not a "map person")?

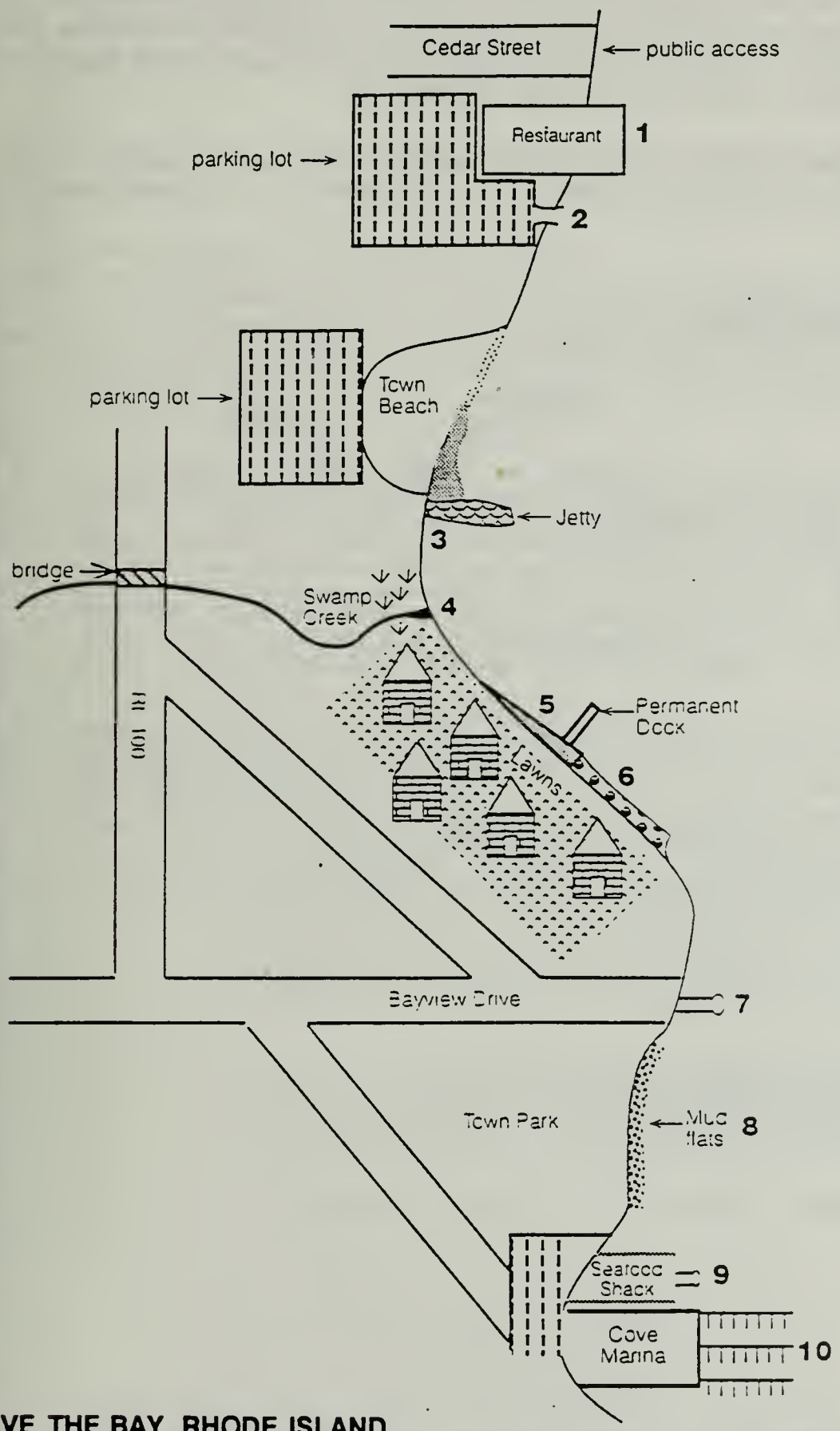
Select your shoreline segment. We suggest that each reach of shoreline be a section with fairly homogenous characteristics of about 1/2 mile. Less or more is entirely appropriate. It will be easier for future stream teams to locate your sites if it is bounded by clear landmarks (roads, bridges and tributaries.

Sketch a map of your shoreline area on an 8.5 X 11 inch piece of paper (see Figure 1). This map will be used in the field to identify locations of possible problem areas discovered during your walk along the stream or shore. Be generous with space; fill up most of the page. Add several landmarks to your map. If you use several of the same landmarks as are shown on a USGS map, computer data entry will be easier when and if a data management system is used. Add a North arrow. Draw a scale bar to indicate the scale.

Photocopy maps for each segment and save the original, unmarked maps for later surveys.

Figure 1. **Sample Map**

Sample Shoreline Map



1. Restaurant built on filled land,

2. Pavement runs to shore, (debris on bank along parking lot / tires appliances), erosion

3. Flock of 15 ducks observed

4. Saltwater marsh adjacent to stream

5. Seawalls made of concrete, breaking down in places

6. Riprap wall

7. 24" pipe at end of Bayview Drive (heavy flow of water)

8. 10 people shellfishing

9. 8" rusty pipe under restaurant (small flow of water)

10. Marina on pilings. approximately 100 slips most boats over 25 ft long

SAVE THE BAY, RHODE ISLAND

D. Including Landowners and the Public

It is essential to work with landowners along the river. Involving them in the Shoreline Survey is an excellent way to enlist their support in the work and in the follow up. At the very minimum, you must notify them if you will be crossing private property. Some groups have found that it is possible to do Shoreline Surveys by canoe, others have walked along shorelines, and others have just been able to do the surveying from roads and bridges. Some groups have asked a member who owns land along the river to write other landowners; depending upon the size of the river, members have knocked on doors and left fliers in the mailboxes; others have mailed letters. (For sample letters, see Figures 2-3.)

Groups have found press releases to be a good way to alert residents about Shoreline Surveys. This is a way to involve prospective members and it makes follow up easier. (For a sample newsletter article, see Figure 4.)

***Figure* 2. Sample Letter to River Resident**

WESTPORT RIVER WATERSHED ALLIANCE
1151 MAIN ROAD, P.O. BOX 3103 WESTPORT, MASSACHUSETTS 02790

September 10, 1990

Dear River Resident,

WRWA invites you to participate in our new River Watch program. We are asking waterfront area residents to join together to monitor the river for pollution or unusual changes and report their findings to WRWA. The Westport River is a precious resource, but increased development, boat traffic, and recreation may threaten the qualities of the river that make it so attractive. If all of us play an active role in monitoring the river today, it will stand a better chance of remaining clean and unspoiled in the future.

To join a River Watch Stream Team, come to an organizational meeting on Wednesday, September 19th, at 7:30 p.m., at the WRWA office, 1151 Main Road. Maria Van Dusen of the Massachusetts Riverways Program will be joining us to discuss the nuts & bolts of this program.

If you wish further information, please call the WRWA office at 636-3016.

Sincerely,

Betsy McEvoy

Elizabeth A. McEvoy
Administrator

Figure 3. **Sample Letter to Riverfront Landowners**

January 23, 1992

Dear Neighbor of the Runnins River,

The Runnins River Task Force and citizens from its three watershed communities, Seekonk, East Providence and Barrington, have joined together in an interstate effort aimed at protecting and restoring the Runnins River. As a landowner along the Runnins, we invite you to join us in our efforts and participate in a visual survey of the river.

Volunteers from the three towns have agreed to monitor and assess the condition of the Runnins River and, as the first step, the volunteers will soon be participating in a visual shoreline survey of the river and its tributaries. To accomplish this survey, the volunteers will access the river via road crossings and then either walk or canoe down the river, observing and recording important instream and streamside characteristics. Care will be taken not to traverse any private property, but it may be necessary to walk along the river's banks in certain areas.

If you have any questions or concerns about this shoreline survey program, please contact me at 433-2351, or Bob Ballou, the Citizen Monitoring Coordinator for the Rhode Island Department of Environmental Management at 277-6519. If you would like to participate in this visual survey, there are still sections of the river that have not been assigned to volunteers.

Thank you for your time, and we hope to work with you in the future.

Sincerely,

Conservation Commission Chair
Runnins River Task Force

Figure 4. **Sample Newsletter or Newspaper Article**

River News

NEW STREAM TEAMS MONITOR THE RIVER

River-watchers have united to help protect the environment in the Westport River watershed. A meeting at the WRWA office on September 19th resulted in more than two dozen volunteers joining "stream teams" to monitor and report on prospective problems in their areas.

The River Watch Program was initiated as calls to WRWA about pollution and other problems increased steadily. "Last spring we had a call about tires being buried illegally," said Administrator Betsy McEvoy. "We called the police and the board of Health, who acted promptly and had the violators remove the tires. More recently, someone saw brush being dumped into the river. The Conservation Commission went to the site, took photos, contacted the responsible party, and had the problem corrected." Reports have ranged from propane tanks washing ashore to human waste floating in the river.

The volunteers will draw maps of their areas, identifying natural as well as man-made structures like ponds, forests, culverts, and docks. Two close inspections a year will produce data on quality of habitats, signs of wildlife, water color, and vegetation. Following each inspection, each stream team will watch for any changes such as clearing land for development, soil erosion, heavy salt use on roads, any form of pollution and litter. The record will also note man-made structures in need of repair or replacement, like culverts and drainage ditches, or hay bales intended to catch soil from cleared land.

All changes seen and reports made will be accompanied by a written report and forwarded to the appropriate authorities. Signs reading "RIVER WATCH AREA -- KEEP IT CLEAN" will be posted in every team's area or along the shore to promote awareness of our fragile environment.

For more information on the River Watch Program, or to join a Stream Team, please contact the Westport River Watershed Alliance at 508-636-3016, or stop by the office at 1151 Main Road, Westport.

E. Conducting a Training Session

Volunteers involved In the Shoreline Survey should attend a training session either prior to the survey or in the field on the day of the survey. It Is imperative that volunteers know what they are looking for and the reasons for the Survey. A review session describing how to fill out the data sheet is Important. Try to arrange for Riverways Program staff to present their slide show to help people identify problems and iearn what to look for. Go over the Stream Team Tips for Shoreline Survey and Observatlons with the volunteers (see Figure 5).

Each palr of volunteers will need a map of their section of the river and data sheets. Discuss how to orient volunteers to the map in the field.

Groups have found it effective to have people talk about the river beforehand. Everyone can say what the river means to them. Volunteers may also have knowledge about the problems of the river and may be able to alert people what to look for.

***Figure* 5. Sample Agenda for Training Session for Stream Teams**

1. Introduce the Shoreline Survey, its purposes and how it will be used In follow up actions.

2. Ask volunteers to say a sentence about what river means to them or concerns they have.

3. Review Data Sheets and Maps
    I. Instream Conditions
    Ii. Stream Corridor
    iii. Wildlife
    iV. Summary Sheets.

If you have slides of the river, or can arrange with Riverways staff to bring their slides, you can use the slides to teach people how to record on the data sheets problems on the river. Or, Instead of using slides, you can use the river as a livlng classroom.

4. Make sure that people have data sheets and maps, know what they will do during the survey, and know what to do with the data sheets after the survey.

5. Discuss Stream Team Tlps and Observations with the volunteers. (For ideas, see Figure 6.)

6. Plan a follow up meeting to plan for later work.

Figure 6. **Stream Team Tips for Shoreline Survey and Observations**

STREAM TEAM TIPS FOR SHORELINE SURVEY AND OBSERVATIONS

When you are ready to begin your walk to record baseline data, keep in mind the following precautionary tips:

- Always work with someone.
- Do not put yourself in danger to gather habitat survey information. The stream bed can be very slippery and uneven, sometimes at unpredictable times and places.
- Be careful of ticks, poison ivy, nettles, insects. Bring repellent. Wear long pants and boots.
- Consider landowners' rights. Try to get the permission of landowners to cross any private land, posted or not. Do not enter posted areas without permission. Take advantage of any public access points.
- Watch out for irate dogs. Walk cautiously and practice good dog etiquette.
- The water is not potable; do not drink it.
- Do not walk on unstable banks; your footsteps could speed erosion.
- Be alert for spawning areas and shellfish beds;. Do not disturb or walk on them.
- Do not attempt to walk across streams that are swift and above the knee in depth. These can be dangerous.
- IF FOR ANY REASON YOU FEEL UNCOMFORTABLE ABOUT THE CREEK CONDITIONS OR SURROUNDINGS, PLEASE STOP YOUR RIVERWALK. YOU AND YOUR SAFETY ARE MUCH MORE VALUABLE THAN ANY OF THE OBJECTIVES OF THE RIVERWATCH!

The following is a recommended list of items to have along on your RIVERWALK:

- Comfortable rubber boots
- Snag and thorn-proof clothing
- Clip board with waterproof cover
- Stream Team data forms
- Two pencils (preferably mechanical)
- Folding ruler
- Compass
- Camera and film
- Gloves
- A buddy

Notes

Section II. Gathering and Presenting Data for a Shoreline Survey

A. Gathering Data

This section will help volunteers understand the intent behind questions on the data sheet. Feel free to change the questions and the format to lead to best protection for your river. In this section, the Data Sheets are on the right hand pages (Figure 7) and the explanations are on the left hand pages.

I. Instream Conditions

These questions will help you determine the health of the stream bed and its water.

A. STREAM BOTTOM:

1-2 **Composition and Color**: Composition can indicate the health of the stream for habitat. Depending upon species, fish need different bottom substrate--from gravel to firm sandy bottoms. Rivers bottoms have different characteristics depending upon their geology. Rivers with a higher gradient (steeper slopes) will have a number of larger sized rocks; flat meandering rivers will have finer grained bottom material. Sand is an important indicator. In many cases, sand occurs naturally; however, much of the sand in our river is sediment from construction runoff and road runoff. This sand covers fish spawning grounds, fills channels and bonds with toxics and poisons. Unnatural amounts of sediment should be noted on the map and in your summary. Orange to red stains results from bacterial action upon iron and may indicate erosion or industrial pollution. Note the color you see. Silt and sand can indicate *nonpoint source pollution* or polluted runoff.

B. WATER:

1-3. **Color and Odor:** Healthy streams can be clear or they can be brownish (tea color) due to tannic acid from wetlands. A muddy or cloudy stream can indicate sediment or total suspended solids from a wastewater treatment plant or polluted stormwater runoff. Milky sections, often accompanied by sewage-odor, a musky or rotten egg smell, indicate an illegal hookup or a leaking septic system, a major source of *nonpoint source pollution*. Oily sheen can indicate either natural decay of organic material along marshes or polluted runoff from roads and parking lots; another form of *nonpoint source pollution*. If the sheen is extensive and appears to be a spill, report it to the Fire Department or Board of Health. Foam can be naturally occuring and can be identified by its brownish color and because it breaks up easily. Foam from unnatural causes (human overuse of phosphates from wastewater treatment plants or from activities such as car washing) is very white or bluish and does not break up easily. Fishy smells may indicate that there has been a fish kill.

4-6. **Flow**: It is important to correlate the flow of the river to different seasons, or to changing but natural conditions such as rainfall or drought conditions. In contrast, some river levels vary and may be lower because of withdrawals and diversions. By keeping a record, you will get to know seasonal changes and unusual conditions. You will have important information to share with officials when new permits are made.

7-8. **Pools, riffles and snags:** These are important for fish because they provide habitat, resting areas, feeding areas and cover.

C. VEGETATION

1-2. **Excessive vegetation:** Excessive numbers of plants or algae in the water indicate excess nutrients from human actions. This too indicates *nonpoint source pollution*. Areas of excessive vegetation should be marked on the map and noted in your summary section under water quality.

II. Stream Corridor

A. STREAM BANK

1-2. Overhanging trees and shrubs are important for keeping the stream cooler. Cooler temperatures means the stream can hold more oxygen. Shoreline vegetation is essential for habitat for both fish and wildlife in the corridor. Vegetation can prevent erosion, sedimentation and polluted runoff from reaching the stream. The condition of the bank is directly related to the health of the river.

Figure 7. **Data Sheets**

SHORELINE SURVEY FIELD DATA SHEET

Segment begins:_____
Segment ends:_____

Date:_____
Observers:_____
Today's weather:_____
Weather over past 24 hours:_____

I. Instream Conditions:

A. Stream bottom:

1. What is stream bed made of?
   Mark from 1 (most typical) to 6 (least typical)

____	Organic debris (leaves, twigs)	____	Gravel (1/4 - 2")
____	Silt (mud)	____	Cobbles (2 - 10")
____	Sand (1/16 to 1/4")	____	Boulders (> 10")

2. What color is the stream bottom? *(Circle One)*
   Black Brown Orange/Red Yellow Sandy Gray Other_____

B. Water

1. What Color is the water? *(Circle One)*
   Clear Cloudy Tea Milky Muddy Other_____

2. Are there indications of... *(Circle)* Oily sheen Foam Scum Other_____
   Describe cause if obvious _____

3. What is the water odor? *(Circle One)*
   No odor Rotten eggs Musky Fishy Oily Ammonia Other_____

4. How deep is the water? *(Circle)* < = less than; > = greater than
   < 1' > 1' > 2' > 3'

5. In your opinion, is the water level *(circle)* **higher** or **lower** than usual for this time of year?
   If problem is severe state why. _____

6. Is the water flowing..... *(Circle One)*
   Quickly Slightly Almost still

7. Number of pools _____ Number of riffles _____ Don't know _____

8. Is the stream flow blocked by *(circle)* **trees**, **trash**, or **man-made objects**? **If yes locate on map*.

C. Stream vegetation

1. Are there areas of extremely dense or clogging aquatic vegetation in any section?
   (Circle one) **Yes** or **No** **If yes locate on map*
   Describe cause if obvious. _____

2. Are there areas on the stream bed or around pipes that are algae covered? _____
   **If algae seems abnormally heavy locate on map.*

II Stream Corridor... *Answer questions and *locate problem areas on map.*

A. Stream Bank

1. Do trees and shrubs overhang the stream and provide shade?_____
   If yes, *estimate what % of bank is shaded.* _____%

II. Stream Corridor (continued)

B. PIPES

Storm drain pipes bring to rivers runoff from roads, parking lots, houses, leaking septic systems, lawns and gardens. In other words, storm drain pipes discharge *nonpoint source pollution* to our rivers from many of our land uses. In addition, illegal drain pipes bring grey water from houses and chlorinated water from swimming pools. It is particularly important to note flows from pipes in dry weather. These flows may indicate illegal hookups. Note the color of the discharge, estimate the diameter of the pipe and the amount of the flow. Do not touch the flow: it may be contaminated. Mark the locations on your maps and, if possible, take pictures of them. If you know that your river has many pipes, you may want to do a separate pipe survey. Included in this manual is a pipe survey sheet and instructions. (For data sheets and instructions, see pages 24-26.)

C. LITTER AND TRASH

Litter and trash often get hung up on snags in the river. Note the amount of trash, its type (paper, plastic, tires, shopping carts, refrigerators, cars!) and describe potential clean up areas. Groups often want to work not only to clean up the trash, but also work to stop future trash by educating the public and nearby businesses and stores.

D. FILL, BRUSH AND CLEAR CUTTING

It is important to identify fill and brush because it interferes with habitat and the ecology of the stream flow. Fill in wetlands and in areas adjacent to rivers is particularly damaging. Fill within 100 feet of the stream bank or wetlands falls under jurisdiction of the Conservation Commission. If you see new fill or brush piles, mark them on your maps. If you notice clear cutting, or removal of all the trees in an area adjacent to the river, mark it down on your sheets and map.

E. RUNOFF

Sixty percent of the rivers surveyed in Massachusetts fail to meet mandated water quality standards. Eighty-nine percent of those rivers fail because of polluted runoff or *nonpoint source pollution*.

F. CORRIDOR

1. **Land Uses:** Because land use affects the health of the river, it is important to document the major land uses in your river segment. Note if lawns are buffered by natural vegetation along the river to protect the river from nutrients and provide habitat, or if they go to the waters edge. Note new construction sites near the shore and see if there are erosion and sedimentation controls in place. Write down signs of erosion from the land including muddy water, sediment deposits or undercut banks.
2. **Public Access:** There may be some unofficial access points which people enjoy using. Some of these need to be formalized and protected. You may want to talk with your Conservation Commission or Land Trust about ways to protect these sites.

III. Wildlife

A. AQUATIC:

You may want to ask anglers for their observations.

B. AQUATIC/LAND SPECIES WHICH ARE DEPENDENT UPON THE RIVER

These species should be noted on the data sheets. To learn if there are rare or endangered or state listed species along your river see the copies of Estimated Habitat Maps of rare state listed wetlands wildlife published by the Natural Heritage Program. These maps, which can be found in your Conservation Commission office, show roughly where rare and endangered species exist. If you find evidence of rare and endangered species, you will want to photograph them and use forms from the Natural Heritage Program to document them for the state. Forms can be obtained from the Natural Heritage Program, DFW, 19th Floor, 100 Cambridge St., Boston, MA 02202. Documentation may offer extra protection.

2. *Circle most widespread stream bank condition.*
Eroding Cleared/cut Developed(buildings or pavement) Wetlands/marsh
Riprap/channelized Lawns Forest Vegetated (shrubs, plants) Beaches

B. Pipes

*Describe pipes on pipe sheet and *locate on map as P1, P2,...P3 etc.*

C. Litter and Trash

*Describe below any potential cleanup areas. *Locate on map*

D. Fill, brush and clear cutting

**Locate on map as fill (F1, F2,...F3) or clear cutting (CC1, CC2,...)* and *describe below.*

E. Runoff

Did you see runoff from any of the following? *(circle)*
Manure Farm animals Bridges/roadways Construction sites Sewage
Parking lots Lawn fertilizer Plowed fields Other sources_____

F. Corridor

1. What are the land uses in your segment? *Check which ones*, and *circle the **dominant** land use type.*

____Industrial	____Landfills	____Wastewater Treatment Plants
____Commercial	____Undeveloped/unprotected Land	____Junkyards
____Agricultural	____Roads	____Illegal Dumps
____Residential	____Railroads	_____Other (describe)
____Golf Course	____Parking Lots	_____Other (describe)

2. Is there public access to the stream? If so, is access appropriate for... *(circle)* and **locate on map*.
canoeing fishing swimming walking(trails) other_____

*If there are areas which are **potential** access points, describe below and *locate on map.*

III. Wildlife... *Estimate number encountered and species in the following categories.*

A. Aquatic

1. Fish or evidence of fish? _____
If possible, *describe species & size below.*

2. Other forms of aquatic life? *Circle type and if you can identify species, do so below:*
Aquatic insects Turtles Snails Salamanders Mussels Clams Other_____

B. Aquatic/land Species

1. Animals or evidence of animals? *(Circle)*
Beaver Muskrat Otter Other _____

2. Water fowl? _____ *Identify species if you can*. _____

3. Do you know if there are rare & endangered species of plants or animals in your segment?
If so, identify. _____

**If you have taken photographs, note locations here and on map #Z1, #Z2,...#Z3, etc. Make sure you mark photos on back with date and location.*

IV. Summary Sheets

The summary sheets are designed to give a "big picture" of your segment and to provide information for a summary report which can be given to the public and town boards. The sheets should be filled out on site by both observers. There are four sections:

A. Water Quality & Quantity
B. Habitat
C. Land Protection
D. Written Description of River Segment

Notes

Figure 7. Data Sheets (cont.)

SHORELINE SURVEY SUMMARY SHEET

SEGMENT BEGINS____

Observer:
Date:
Weather:
Season:

SEGMENT ENDS:_____

Please answer the following:

River quality: Looking back at your Field Data sheet and including observations,

1. Are there places which need to be monitored further? *(Circle)* Yes No. Identify.

2. Are there problem areas which require immediate action? *(Circle)* Yes No. Describe & identify on the map.

3. Are there places which require a clean up? (Circle) Yes No. Describe & identify on the map.

Habitat: How would you describe habitat in your section?

1. Adequate water flow for the season?
   (Circle) Yes No Don't know

2. Did you see evidence of siltation from *(circle)*: roads bridges pipes construction? If yes, *circle: widespread localized.*

3. Majority of river bank vegetated, developed or clear cut?

4. Shade over stream?

5. Number of species seen? *(Circle)* >15 >10 >5 <5

Comments:

Overall, the section of the river is *(circle):*

Excellent, good, fair, poor, degraded.

Land Protection: Did you find any large tracts of undeveloped land which may need to be protected? Describe.

Did you find areas which could be explored for trail development or fishing or canoe access? Describe.

Are there informal access points? Describe.

SHORELINE SURVEY SUMMARY SHEET

NARRATIVE DESCRIPTION
Describe your segment in a paragraph. (See samples below)

Samples:
Segment 1 extends from the headwaters near Sunshine Drive downstream approximately 0.5 miles and is a seriously damaged portion of the river. Most of the brush has been removed during construction of single family residences thereby reducing bank stability and subjecting the soil to erosion by water. Over 40% of the streambank has been affected to the point that it is now contributing excessive quantities of sediment. Trash, tires and yard debris are commonly seen through out this segment.

Segment 2 flows slowly through this 0.5 mile segment and is virtually undisturbed. The land is owned by the State Department of Fisheries and Wildlife. Vegetation within the upper bank ranges from thick stands of marsh grass to open woods.

Segment 6 flows south between the railroad and Interstate Highway 5 through dense blackberry, willow, marsh and other trees. Surface runoff from light industry at the southern section as well as railroad practices may be contributing sediments, toxins, oils and greases or nutrients.

Samples are taken from EPA's manual Streamwalk.

YOUR NARRATIVE DESCRIPTION FOR SEGMENT # ___ OF THE _____(River, Brook). The segment begins at _____ and ends at _____.

Thank you! Please return these sheets and your map to your team leader.

Notes

B. Conducting a Pipe Survey

The purpose of the Pipe Survey is to learn if storm drains and pipes are flowing in dry weather. Because storm drains are designed to bring storm water to the river, they should flow only during and just after a storm event. If they are flowing during dry weather, they may be bringing pollutants to the river. Some of the sources of these pollutants could be leaking septic systems or illegal hook ups. It is therefore very important for groups to answer questions about weather conditions on both these data sheets as well as on the basic Shoreline Survey Field Data Sheets.

Some groups do a Pipe Survey as part of their basic Shoreline Survey; other groups find that there are too many things to record to combine the two surveys. They do pipe surveys separately.

To conduct a shoreline Pipe Survey, groups walk along the river where it is accessible, drive to roads or parking lots that abut the river or tributaries. Bridges are a good location to look for pipes that are street drains but which may also have illegal tie ins or groundwater infiltration. Do not cross private property without permission. Do not touch the liquid coming out of the pipe. Do not put your head or hands inside the pipe

Filling out the Pipe Survey Forms (see Figure 8. The first row has been filled in as an example. For sample pipe survey map, see Figure 9.)

Pipe #: Write your numbers chronologically beginning with # 1. For a long stretch or one with many pipes, you may need to photocopy more than one sheet per section.

Date: Fill in the date you did the Shoreline Survey.

Time: Write the time you checked each pipe.

Weather today: Describe whether the weather was sunny or overcast. Include the air temperature and, if possible, the water temperature.

Weather in last 48 hours: Describe the weather in terms of last rainfall.

Pipe material: Describe the material as best you can (concrete, plastic or metal.) If the pipe is cracked, corroded, or discolored mention this too.

Pipe size and amount of flow. Indicate the pipe diameter either by measuring through the center or estimate if measuring is not possible. Indicate amount of flow by drawing the water level in the pipe and describe whether the flow was roaring, moderate, a trickle or dripping.

Color of flow: Describe the color as best you can. Color can be clear, clear with a sheen, rusty brown color, reddish brown, green or whitish. If the material is very solid or has particles in it, you may want to indicate this here.

Odor: Describe the odor as best you can. Odor can range from no odor, to dank and musky, strong musky, fetid (rotting), urine, sewage, to chemical (acrid).

Comments: Note what the pipe seems to be used for. It may be a storm drain (a device for taking rain water from parking lots and roads.) The pipe could be a hose from a house or a swimming pool. If you think the pipe is one that should be monitored further or requires action, note those comments in this column.

If possible, return to drain pipes under different conditions: different times of day, different days of the week, different weather conditions, to see when they are discharging.

ABOVE ALL, BE CAREFUL. ALTHOUGH THE WORK YOU WILL BE DOING IS VERY IMPORTANT AND MUST BE ACCURATE, YOU SHOULD BE AWARE THAT AS VOLUNTEERS ANY ACCIDENTS THAT RESULT ARE ONLY COVERED BY YOUR OWN INSURANCE--USE CARE AND COMMON SENSE.

Figure 8. Pipe Survey

Segment#_____ Names of observers:_____

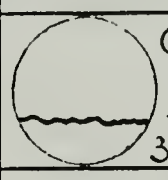
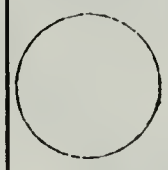
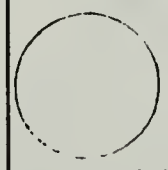
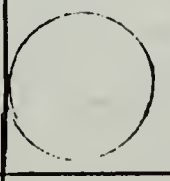
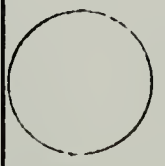
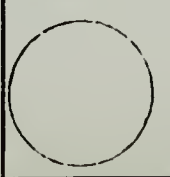
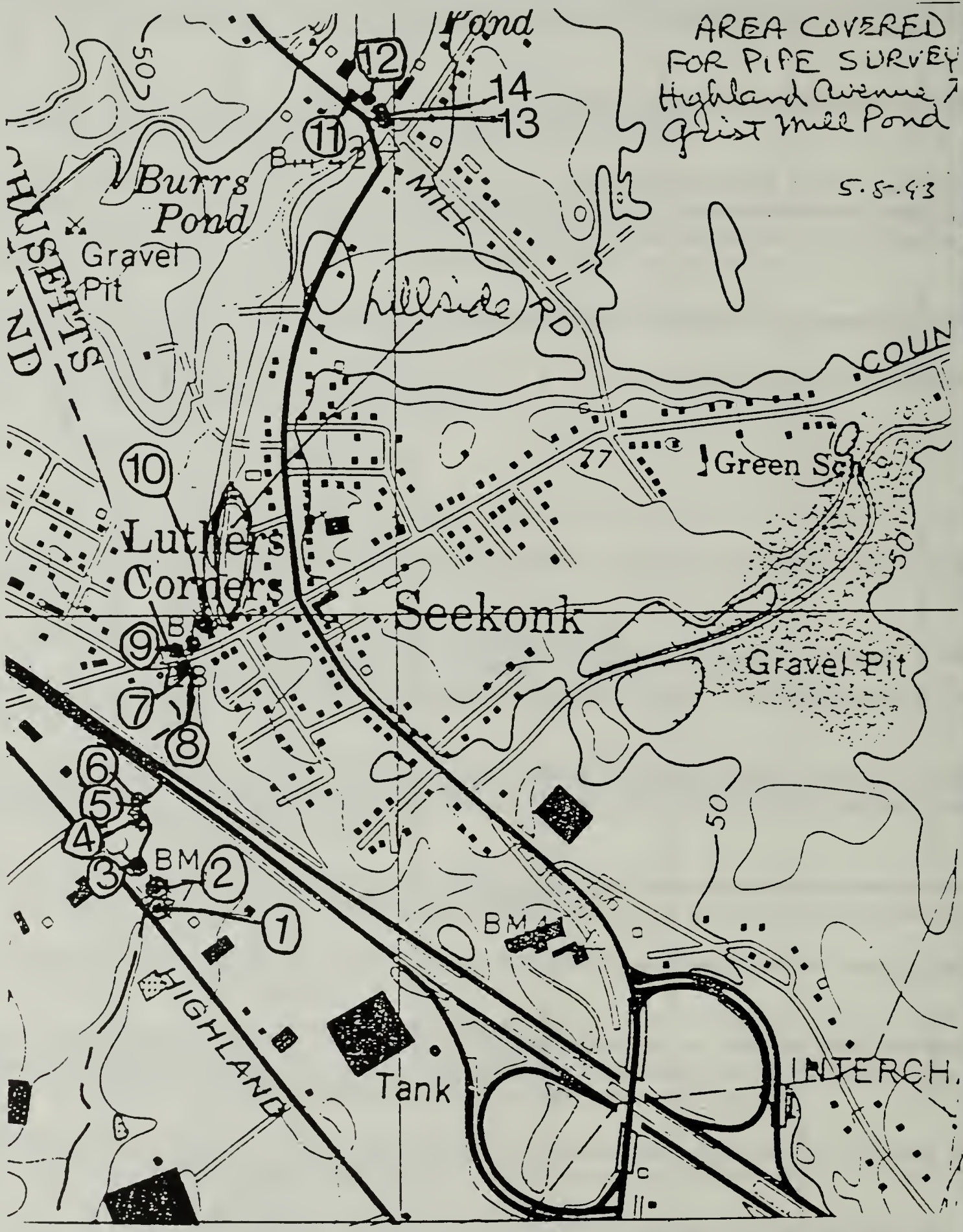
Pipe#	Date	Time	Weather today	Weather in last 48 hours	Pipe material	Pipe size/amount of flow	Color of flow	Odor	Comments
Sample #1	5/8/93	8:40AM	sunny + clear air temp 75° water T° 60°	clear, no rain	concrete good shape	 constant moderate flow 36" diameter	reddish brown	fetid odor	Storm drain. needs to be rechecked.
1									
									
									
									
									

Figure 9. **Sample Pipe Survey Map**. This is an enlarged U.S.G.S. topographic map with pipe numbers indicating location of pipes surveyed.



C. Presenting Data

From the summary sheets and your data sheets, the Steering Committee can put together a Shoreline Survey Report which you can name "State of the _____ River, 1994", or "Results of Shoreline Survey Along the Banks of the _____River." This report will be the most useful product of the Shoreline Survey because it can be given to the public and appropriate officials and it can be compared to conditions in later Shoreline Surveys. You will want to include copies of the maps in the report as well as an overview of the river segments. There should be descriptions of the segments. Try to include photographs. The report should be dated and contain the names of the volunteer surveyors, a copy of the data sheets and a description of the methodology used. Many groups put together a large map of the entire river on a base map. Use color or codes to identify different uses and abuses. Be sure to put your key right on the map. You may want to make one or more overlay maps using mylar, a clear material on which you can draw certain features and lines, but still see through to the base map. Your map can help you locate future sampling sites, habitats, pollution sites, access points, problem conditions, etc.

The report can be presented to town boards (with the press present) and can be filed in the town library. Copies can be sent to state agencies. Several groups have held a pot luck supper or dessert to bring members together to hear the results of the Shoreline Survey. Beginning at the headwaters, volunteer surveyors briefly describe what they saw. Some groups ask each volunteer to tell something good they saw and something of concern. At the end of the meeting, an oral picture or tapestry, has been created. Some groups supplement the stories with photographs on poster board or foam core. Other groups have volunteers take slides of their sections of the river, and a slide show tells the story of the river with the volunteers describing their slides and giving a summary of what they have seen.

At the end of this presentation, your group should describe and get member reaction to possible future planning for the river. Both short-term and long term planning result from the information you learned during the Shoreline Survey.

Section III. Taking Action

A. Taking Immediate Action:

Your group needs to address some problems immediately. For example:

- •report pollution problems to the Board of Health and the Conservation Commission and DEP.
- •report fish kills to the Division of Fisheries & Wildlife.
- •report oil spills to local fire departments.
- •plan clean ups for areas where observers found trash.
- •work with landowners to promote good river stewardship.

B. Planning for Long Term Action:

For the long term, a plan is essential because it will help you work on the important issues and not get distracted by less important and time consuming projects. To make the plan, look at the problems found through the Shoreline Survey, prioritize them, make choices, determine a time line, and go to work to make sure remediation is done.

1. Look at the problems from the Shoreline Survey:

(a) WATER QUALITY

PROBLEMS: From their Shoreline Survey, some groups find that water quality is the major problem. Examples and indicators of problems:

- •*Nonpoint source pollution* from land use practices:
  - •sediment from construction sites, roads or bridges.
  - •odor from failing septic systems.
  - •excessive aquatic vegetation near golf courses, lawns or farms.
  - •discharges from drain pipes.
- •*Point source pollution* from wastewater treatment plants, drainage pipes and combined sewer overflows:
  - •odors or coloration from discharge pipes.
  - •discharges from drain pipes

SOLUTIONS:

- •design and start a water monitoring program. (See the Massachusetts Water Watch Partnership's Manual for Volunteer Water Quality Monitors).
- •conduct seasonal or yearly Shoreline Surveys.
- •work with your Board of Health to pinpoint sources of contamination.
- •work with SCS/Conservation Districts to Institute Best Management Practices to prevent polluted runoff.
- •institute a public education program to help landowners and others become more aware of practices which harm the river. (See Riverways brochures on nonpoint source pollution.)
- •work on local riverfront bylaws to prevent future construction inappropriately close to the river. (See Riverways Community Guide: Strategies for Drafting and Passing Local River Protection Bylaws.)
- •work with state and local officials to stop polluted flows from drain pipes.
- •Institute a "Good, Bad & Ugly" Program to monitor discharges from point sources. (See Riverways brochure "Citizen Participation in the NPDES Process".)
- •testify at hearings and write letters to newspapers on specific proposals.
- •establish annual clean ups and start a public campaign to reduce litter.
- •share data with state agencies that are working on a watershed approach to resource protection.

(b) EROSION AND SEDIMENTATION

PROBLEMS: Although rivers constantly erode, transport and deposit sediment as a natural function, human activities can increase these processes and degrade the river. Shoreline Surveys confirm the existence of:

- •paved surfaces upstream which increase peak flooding leading to increased erosion and

sedimentation.

•lack of vegetation on the banks which can increase erosion and sedimentation.

•excessive sand in the river from storms drains caused by winter road maintenance.

SOLUTIONS: Your group may

•talk with the Conservation Commission and Planning Boards who have jurisdiction over the development if it is in process.

•talk with the Planning Board and landowners and ask them to consider retrofitting of detention and retention basins to prevent peak flows if the development is completed.

•work on a riverfront protection bylaw to prevent inappropriate development too close to the river in the future.

•work with landowners to promote good stewardship on their land.

•work with the Soil Conservation Service/Conservation Districts and encourage bioengineering solutions (vegetative solutions instead of riprap or structural solutions) to prevent erosion.

•work with the DPW to intercept the sand before it gets into the river, to clean or redesign catch basins to make them more effective. (The DPW may not realize the impact of sand on fisheries and stream ecology.)

(c) FLOW

PROBLEMS:

Groups find many rivers have inadequate flow for good stream health.

SOLUTIONS: Your group may want to

•conduct a flow study and document water levels with measurements and photographs.

•work with USGS to encourage them to install a staff gage on your river.

•raise the consciousness of citizens, municipal government, and businesses about water conservation. (See Riverways' "Conservation Works: The Ecological and Economic Benefits of Conserving Water.)

•testify at hearings on diversions and water withdrawals.

(d) LAND PROTECTION

PROBLEMS:

inappropriate construction near the river harms water quality, affects flow, destroys habitat, increases erosion and sedimentation and precludes access. From your Shoreline Survey, you can identify land that could be protected and could enhance the river and its corridor.

SOLUTIONS:

•work with a local or regional land trust, a watershed association, your Conservation Commission, and state agencies to protect land.

•work with your community to encourage them to apply for land acquisition funds from the state's Conservation Services. (For more information, contact Conservation Services at 617-727-1552 X 298). To be considered for funds, your community must have a current Open Space Plan.

•work with your community to update a lapsed Open Space Plan; include recommendations for protecting undeveloped parcels near rivers and streams.

•encourage donations of Conservation Restrictions (CRs) by working with landowners, Conservation Commissions, land trusts. See Stephen Small's Preserving Family Lands: A landowner's Introduction to Tax issues and other Considerations (1994). Riverways has copies of the 1988 version which we can send you.

•work to protect large parcels which are linked to already protected areas. The Department of Fisheries & Wildlife, & Environmental Law Enforcement, the Department of Environmental Management and the Metropolitan District Commission have programs to protect land. If there is a large piece of land along your river which could be sold, call Riverways and we can put you in touch with one of these agencies.

(e) HABITAT

PROBLEMS:

Habitat may require further identification, protection or restoration.

SOLUTIONS:

•conduct a follow up habitat survey.

•model your work on the Ipswich River Watershed Association's Conservation Strategy where naturalists from local colleges, high schools and the community surveyed species and their habitats and defined critical or important areas. (For more information about the Conservation Strategy, call Riverways, 617-727-1614 X 360.)

•conduct a more detailed bottom substrate survey. (Call Riverways, 617-727-1614 X 359.)

•work with Riverways and the Division of Marine Fisheries on a Fishway Stewardship Project. (Call Riverways, 617-727-1614 X 359.)

(f) ACCESS

PROBLEMS:

You may find that there is inadequate access along your river. People are likely to become river advocates if they can walk, and canoe, fish and enjoy the rivers.

SOLUTIONS:

•work with landowners, land trusts, and Conservation Commissions to increase access and to develop trails. Some groups have received grants from ISTEA, the Riverways' Small Grants Program and DEM's Greenway Grants Program to do this type of work. (Call Riverways, 617-727-1614 X358.)

(g) CONSTITUENCY

For all these problems, an important part of the solution is to create a constituency for your river and its tributaries. To do this, consider:

•writing newspaper articles
•creating a newsletter
•sponsoring friendly "go see" tours with industry, town boards & the public
•sponsoring clean ups
•sponsoring river festivals
•sponsoring canoe trips.
•asking a river abutter to hold a stewardship meeting.

2. Setting priorities

You may find that setting priorities for your river work is easy. If there are several issues which need work, you may want to perform triage using the following (or other) questions.

•which activities are most important for the river?
•which activities could best be done by others with your support and encouragement?
•which activities would increase awareness of the river?
•which activities will strengthen your organization and are actually practical for your group now?

3. Making a work plan

Once you have determined your priorities, create both a five year and a one year work plan. Make your one year work plan specific with tasks, assignments and deadlines.

4. Taking Action

The following worksheets may help you follow up your Shoreline Surveys with Action.

Figure 10: Quick Guide for Effective River Watching
Figure 11: River and Watershed Contacts
Figure 12: Calls and Complaint Form
Figure 13: Stream Clean-up Information Sheets
Figure 14: How to Join the Adopt-A-Stream Program

Figure 10. **Quick Guide for Effective River Watching**
Members of the various watershed associations and Adopt-A-Stream Groups can be effective protectors of the many streams and rivers in our state.

Observation	Problem	Action
Crashed tanker truck leaking fluids into a stream	May be toxic materials	Call State Police (look for chemical number red diamond on truck). Call Hazardous Waste Hotline 1-800-424-8802.
New fill material on stream bank or wetland	Destruction of habitat	Call local Conservation Commission
Newly cleared land near stream or wetland	Destruction of habitat, runoff and sedimentation into stream	Call local Conservation Commission
Many (> 10) dead fish	Kill from toxics or changes in natural conditions.	Investigate extent, number and species of kill. Are fish dying or decaying? Call Fisheries & Wildlife at Westboro (508- 792-7270) and District Offices.
Oil Slick	Water pollution	Call Hazardous Waste Hotline at 1-800-424-8802, Coast Guard, or local fire department or Board of Health.
Blockage in fishway or stream, low or no water in fish ladder	Barrier to migrating fish	If marine species, call Division of Marine Fisheries (508-888-3590 on South Shore; (508-745-3107 on North Shore). If inland fisheries, call Fisheries & Wildlife, (508-792-7270).
Sediment Bars or Silt deposits	Degradation of Habitat	Investigate possible source of pollution. Call local Conservation Commission or work with local DPW. If from a state road, call MA Highway Department (617-973-7002)
Milky water	Sewage pollution	Call local Board of Health or Department of Environmental Protection (617-292-5500) to get regional office numbers.
Trash or litter	Illegal dumping	Organize River cleanup. If witness dumping, call Environmental Law Enforcement hotline 1-800-632-8075.
Large areas of green algae	Nutrient overload	Investigate extent. Call local Conservation Commission.
Eroded Stream banks	Lack of buffer strip; excessive development in watershed.	Investigate extent. Call local Conservation Commission.

Figure 11. River and Watershed Contacts

RIVER & WATERSHED CONTACTS

DATE:_____

RIVER:_____ WATERSHED:_____

contact person *address* *phone number*

LOCAL ENVIRONMENTAL GROUPS

HUNTING/FISHING ASSOCIATIONS

LAND TRUSTS

LOCAL OFFICIALS

Conservation Commission

Planning Board

Recreation and Parks

Economic Development

Selectmen/City Council

Board of Health

LEGISLATORS

MA Representative(s)

MA Senator

US Representative

US Senators

PRESS (newspapers/radio stations/local cable television stations)

STATE AGENCIES

Department of Fisheries, Wildlife & Environmental Law Enforcement

-Riverways/Adopt-A-Stream Program (617) 727-1614 x360

-Div.F&W Fleld Hdqurtrs (617) 366-4479

-Western Wildlife Dist. (413) 447-9789

-Conn.Valley Wildlife Dist. (413) 323-7632

-Central Wildlife Dist. (508) 835-3607

-Northeast Wildlife Dist. (508) 263-4347

-Southeast Wildlife Dist. (508) 759-3406

Department of Environmental Protection

Technical Services Branch, Westboro, MA 01581 (508) 366-9181

-Northeast Region (617) 727-5194

-Central Region (508) 792-7653

-Southeast Region (508) 947-1231

-Western Region (413) 785-5327

Figure 12. Stream Team Calls and Complaints Form

STREAM TEAM

Calls and Complaints Form

DATE OF COMPLAINT:_____19_____

CALLER'S NAME:_____TEL._____

ADDRESS:_____

LOCATION OF COMPLAINT:_____

_____

NATURE OF CALL:_____

_____

_____

ADVICE:_____

_____

ACTION TAKEN - GIVEN BY / DATE:_____

ACTION:_____

_____

TOWN / DATE:_____

ACTION:_____

_____

OTHER / DATE:_____

ACTION:_____

_____

COPIES SENT TO:_____ DATE:_____

_____ DATE:_____

_____ DATE:_____

_____ DATE:_____

Adapted from Westport Rivers Watershed Alliance

Figure 13. **Stream Clean-up Information Sheets**

Clean-ups along rivers and streams can be an important follow up to Shoreline Surveys. Some clean-up will have the immediate result of making the rivers more attractive for anglers, canoeists, walkers, and landowners. Clean-ups may accelerate the natural restoration processes of new vegetation along the stream banks. We ask that you leave the river and its banks in a natural state giving careful consideration to the following:

Conservation Commissions:

• In order to protect the wetlands, streams and banks, the Wetlands Protection Act (and in some cases local wetland bylaws) give Conservation Commissions jurisdiction over any activity that takes place in the wetlands and within 100 feet of wetlands and streams. Consult with them and show them where you plan to clean up. You will need their permission for removal of trees, logs, and vegetation in these critical areas. To make an appointment to discuss these issues with the Commission, call Town or City Hall and ask to speak to the Commission administrator or to a Commission member. **Enclosed is a form which you can fill out and give to the Commission.** Find out if you need to make formal application.

Property rights:

•Before crossing over or cleaning privately owned lands be sure to get permission from the landowner.

Protection of the river:

•Because the river's natural flow needs to be protected, and because streams naturally change their direction, avoid trying to steer them or contain them within the confines of a certain area by barriers.

•Use cutting and clearing equipment in such a way as to avoid and minimize streambank erosion.

•Direct volunteers to avoid trampling the stream bank where the growth of young or fragile plants prevents bank erosion.

Wildlife/habitat:

•Remember the trees and shrubs adjacent to a stream provide shade which helps keep streams at temperatures below 70 degrees so that they will provide healthy habitat for fish and discourage the growth of algae.

•Branches and logs in streams provide protection for fish and small animals. It is important to maintain a certain percentage of shade cover from nearby trees over a stream bed as well as to leave some logs in streams to provide protection for fish and small animals.

•Small wildlife and birds use brush and ground vegetation for habitat and foraging. Remove only the amount absolutely necessary for your purpose (fishing, walking and canoe access.)

•Instream work in streams used by migrating alewives should be done during July and August. This is to avoid the spawing and migrating season. It is best to do instream work when flows are at their annual low.

continues

Figure 13. **Stream Clean-up Information Sheets (cont.)**

STREAM CLEAN-UP TIPS

Before you start your clean-up talk to your group about what can be done and what can not be done according to your clean-up project plans and the comments of the Conservation Commission.

Remember that a clean-up should benefit the river and leave it in a healthy natural state. It is not just to make it nicer for the people using the river.

Follow common sense safety rules and keep in mind the following suggestions.

* Always work with in pairs or with a team captain.

* All children must have adult supervision.

* Do not put yourself in danger. The stream bed can be very slippery an uneven, sometimes at unpredictable places and times. Move slowly.

* Watch for sharp objects submerged in the stream bed and on the banks, nails in old planks or logs.

* Do not attempt to walk across streams that are swift and above knee in depth. These can be dangerous.

* Be alert for spawning areas and shell fish beds; do not disturb or walk on them.

* Watch for poison ivy and brambles, ticks, nettles, and insects. Bring repellant; wear long pants and boots.

* Consider landowners rights. Try to get the permission of landowners to cross private property, posted or not. Do not enter posted areas without permission. Take advantage of public access points.

* Persons using canoes must wear personal safety flotation devices and keep clear of volunteers on foot.

* Chain saws must only be used by owners and when other methods are inadequate. Others should stay clear of the area when chain saws are in use.

* Be sure to review your clean up plan with the Conservation Commission.

IF FOR ANY REASON YOU FEEL UNCOMFORTABLE ABOUT THE STREAM CONDITIONS OR SURROUNDINGS, PLEASE STOP YOUR CLEANUP. YOU AND YOUR SAFETY ARE MUCH MORE VALUABLE THAN ANY OF THE OBJECTIVES OF THE CLEAN-UP.

(These safety tips come from the Town River Clean-Up Committee of the Taunton River Watershed Alliance and EPA Region 10 Streamwalk.)

continues

Figure 13. **Stream Clean-up Information Sheets (cont.)**

Because Conservation Commission have jurisdiction over work done within 100 feet of stream banks and wetlands, talk with your Commission before beginning your work. Fill out this worksheet before you talk with them.

Conservation Commission Worksheet for

A RIVER CLEAN-UP FOR THE _____RIVER

Proposed by (group)_____

Proposed work date(s) _____
rain date (s)_____

Date of approval by Conservation Commission_____

Groups' contact persons' names, address and tel.no:

_____

_____

_____

1. What is the purpose of your clean-up? (access to river, canoe access, canoe passage through river, fishing access, habitat improvement) Describe:

Is the work you propose going to be? (you may need to determine this as you talk with the Commission members)

___on the bank itself
___on the stream bottom
___in a wetland
___in the buffer zone (within 100' of stream or wetlands)

Does the work include?

___removing man made litter for scenic improvement
___removing brush for walking or canoe access: describe amount and type of vegetation to be removed.
___clearing the stream for canoe passage: will logs be left for fisheries and wildlife habitat? What is the minimum the group can remove and still allow canoe passage?
___clearing the bottom of the stream of man-made trash?
___other, describe:

continues

Figure 13. **Stream Clean-up Information Sheets (cont.)**

2. Define Where you are going to work.
2.Show the Commission on a map and describe the area as best you can. (Along the banks of the X river, between X street and Y bridge, from the bank to about 50 feet from the river.)

3. **What tools do you plan to use?**
____hand-held tools only
____power tools
____bobcats? trucks?
____other, describe?

4. **How will you dispose of the trash collected?**

5. **What measures are you going to use to protect the natural resources: e.g. banks from eroding, silt from going into the stream, wetland damage.** (This also may be determined in conjunction with the Commission.) Examples: leave vegetation on the banks, not cut the wetland vegetation, leave brush on the ground, leave enough logs on the stream for pooling and shelter for fisheries.

6. **Do you have written permission from the landowner(s)?**_____
Name(s) of owners

_____

_____

7. **Conservation Commission Guidelines:**

It is the responsibility of the applicants to inform the clean-up volunteers of the scope of the work to be done and the guidelines of the Conservation Commission.

Spring, 1994

Figure 14. **How to Join the Adopt-A-Stream Program**

HOW TO JOIN THE ADOPT A STREAM PROGRAM

Do you have a raging river of pollution going through your town, or fishing spot on a river that seems lacking in the usual abundance of fish species, or a stream that you fear will be changed drastically from its quiet meanderings by a nearby proposed development, or a favorite stretch of stream or river that has always been a place for quiet reflection?

The **Adopt-A-Stream Program** of the Department of Fisheries, Wildlife and Environmental Law Enforcement can provide help to interested citizens who want to take action to preserve or improve the quality of the river or stream nearby and its supportive ecosystem.

These steps outline how you can Adopt-A-Stream:

1. Contact the Adopt-A-Stream (AAS) Coordinator, Riverways Programs, Department of Fisheries & Wildlife, 100 Cambridge Street, Room 1901, Boston, MA 02202, (617) 727-1614 X 384.

2. Fill out the forms contained in the Adopt-A-Stream Workbook requesting information about your stream, your organization and your concerns. Be sure to fill out the form describing your issues and needs. (See pg. 39.)

3. Call the AAS Coordinator to discuss your concerns and ways to work together.

4. Schedule an on-site visit for us and/or a meeting with key people in your organization. As appropriate, we will arrange for fish and wildlife biologists, water quality specialists, or land management experts to evaluate the condition of your stream and its banks.

5. Develop a preliminary action plan to address river issues using us as consultants as needed. Work with AAS staff to develop a scope of agreement which describes your action plan for addressing river issues.

6. Determine with the AAS staff what level and type of service you can best use and who can best provide assistance to implement your action plan.

7. Receive Adopt-A-Stream designation and use Riverways support for an action plan, for citizen education or for organizational activities. Organize a time, place and event to receive your AAS certificate. Invite the press, local officials, other environmental and civic groups, the local watershed association and state representatives and senators to the event. We will make the presentation and help you celebrate the adoption.

It may be that you do not have an organization and need help getting started. Or it may be that some other state agency should also be involved in helping you. Our goal is to work with you to understand each situation and find the method of stream and ecosystem protection most likely to be successful. Call us.

continues

Figure 14. **How to Join the Adopt-A-Stream Program: Background & Worksheets** (cont.)

Issues of Greatest Concern
Number 1 to 11 in order of concern to your group, with 1 being the most important.

___Point source pollution (wastewater treatment plants, industries, etc.)

___Non-point source pollution (agricultural runoff, erosion, urban runoff, septage systems, etc.)

___Riverfront land acquisition, conservation easements

___Wildlife habitat and management

___Fisheries habitat and management

___Open Space/recreation/access

___Local regulations or bylaw protection of water and open space resources

___Public information and education about watershed resource issues

___Water supply or conservation

___River diversion

___Other (please describe)_____
_____.

Greatest Organizational Needs

_____Understanding state or federal government systems related to water supply and rivers

_____Understanding local government options for protecting waterways

_____Mapping land uses/ownership/habitat/water resource areas, etc.

_____Use of media

_____Running good meetings and a strong organization

_____Educating the public; involving the public

____Finding funds

_____Other (specify)_____

What specific projects do you have in mind for protecting the stream or river you want to adopt?_____
_____
_____

APPENDIX A: AN INTRODUCTION TO STREAM ECOLOGY

ECOLOGY: the study of organisms in relation to their environment.

STREAM: a body of water moving in a more or less definite pattern through the path of least resistance to a lower elevation.

ECOSYSTEM: basic unit of ecology, an interacting system.

Running water ecosystems are hard to generalize about, varying from fast flowing, cold, headwater mountain brooks to slow moving, weedy, warm, large lowland rivers.

****** Streams are products of their watersheds! ******

STREAM HABITATS COMPARED TO POND HABITATS

	Rivers and Streams	Lakes and Ponds
Energy Sources	External	Internal
Stratification	Headwaters to Mouth	Shoreline to Offshore
Current	Major factor: gravity	Minor factor: winds
Water Conditions	Changeable but uniform	Stable but stratified

Current speed is a major determinant of stream substrates and aquatic communities.

LAND-WATER INTERFACE
Streams are intimately connected with the surrounding land. A healthy stream is a result of a healthy watershed.

TEMPERATURE
Coldwater streams - max. temperatures less than 70F, i.e. trout streams
Warmwater streams - higher temperatures, i.e. bass, catfish, pickerel

OXYGEN
Streams are generally well oxygenated, at or near saturation. Stream fish are adapted for high oxygen levels.

POOLS AND RIFFLES
Pools - areas of slow moving deep areas with fine substrates.
Pools serve as cover and resting areas.
Riffles - areas of fast moving, shallow areas with coarser substrates.
Riffles serve as food production and feeding areas.

COVER
Cover is very important to stream fish. Cover in the form of boulders and woody debris also offers attachment surfaces for invertebrates.

STREAM HABITATS INFLUENCE THE BIOLOGICAL COMMUNITY COMPOSITION.

STREAM ORGANISMS ADAPTATIONS TO RUNNING WATER.
1) Permanent attachment 2) hooks, suckers, adhesive surfaces
3) streamlined bodies 4) flattened bodies 5) orient into current

Energy Flow in streams

Much of the energy that drives the stream ecosystem is from outside the stream. Energy is in the form of organic matter such as leaves, twigs, etc.

This energy is harvested by groups of invertebrates (i.e. mayflies, stoneflies, caddisflies) called collectors or shredders.

These invertebrates are then fed on by small fish species such as shiners and young stages of other fish species.

These smaller fish are then fed upon by larger predatory fish.

Large predator fish can then be harvested by man or serve as dinner for other predators such as kingfishers, mink, otters or turtles.

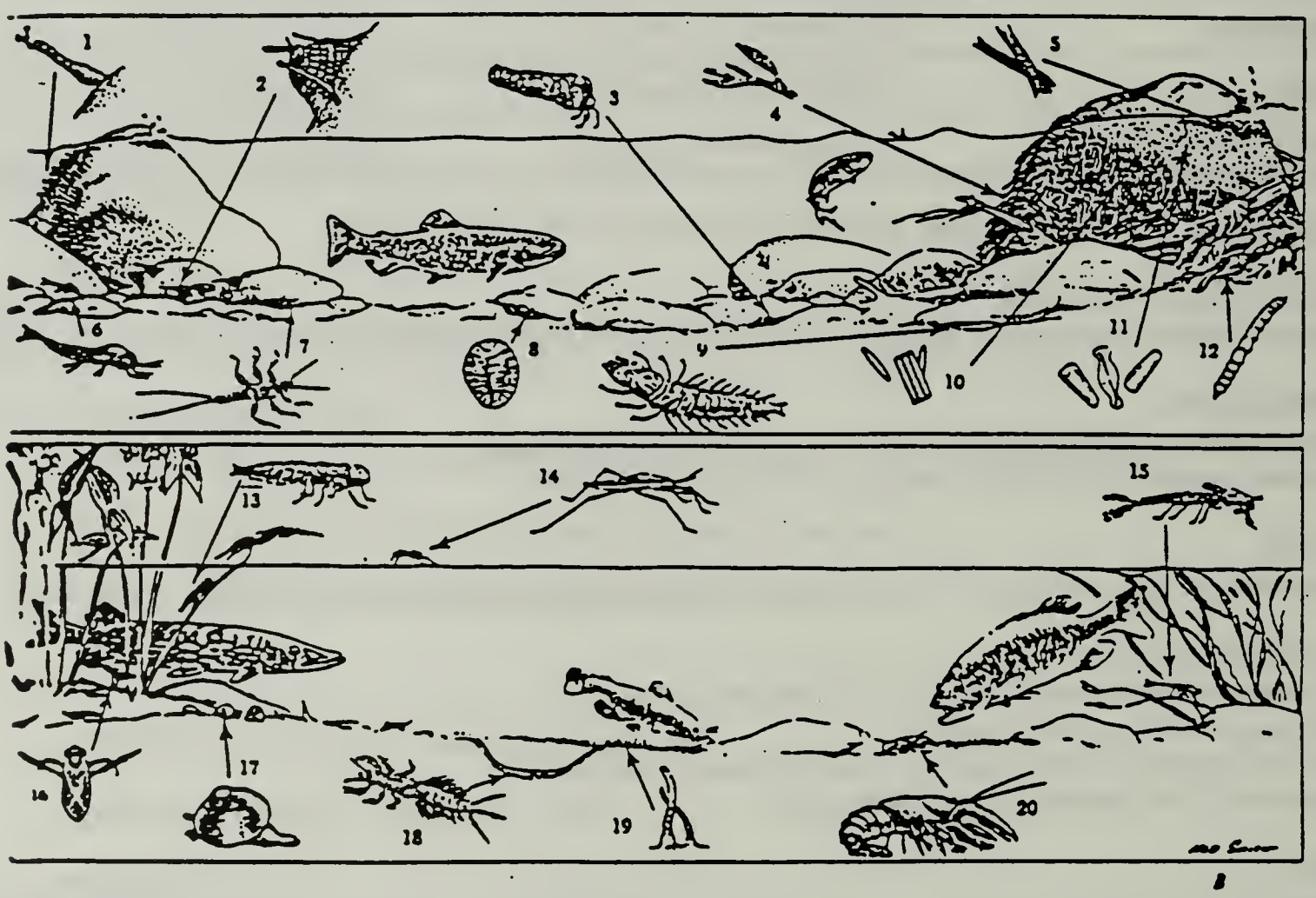


Figure 10-5. Life in a fast stream compared to that in a slow stream. (1) Blackfly larva; (2) net-spinning caddisfly; (3) stone case caddisfly; (4) water moss (Fontinalis); (5) alga Ulothrix; (6) mayfly nymph (Isonychia); (7) stonefly nymph (Perla); (8) water penny; (9) hellgrammit; (10) diatoms (Diatoma); (11) diatoms (Gomphonema); (12) cranefly larva; (13) dragonfly nymph; (14) waterstrider; (15) damselfly nymph; (16) water boatman; (17) fingernail clam (Sphaerium); (18) burrowing mayfly nymph (Hexagenia); (19) bloodworm; (20) crayfish. The fish in the fast stream, above, are (left) brook trout, (right) redbelly dace. The fish in the slow stream, below, are (left to right) northern pike, bullhead, and smallmouth bass.

Appendix: Nonpoint Source Pollution

Sixty percent of the rivers assessed in the Commonwealth fail to meet federally mandated water quality standards. Eighty-nine percent of these streams fail to meet standards because of polluted runoff or nonpoint source pollution. Because the Shoreline Survey is an excellent tool to identify nonpoint source pollution, encourage those working on Shoreline Surveys to read this appendix.

Nonpoint Source Pollution and River Systems.

Sediments result from runoff from many sources including construction, farms, highway maintenance, gravel operations, logging, stream channelization, roads, storm drains and stream banks. In addition to problems caused by volume of sediment, the sediment load includes toxics and heavy metals which bond to sediments and accumulate on river beds.

Over a specific amount of time, sediments from areas where construction has drastically altered or destroyed the vegetative cover and soil mantle can exceed 20,000 to 40,000 times the sediments from adjacent undeveloped woodland. (Middiesex Conservation District. October 7, 1988.)

Sediments threaten fisheries, fill river channels and wetlands, increase flooding, reduce light and clarity, harm drinking water and damage the natural ecology of the river. Sedimentation is one of the major causes of the decline of fisheries in the nation. Sedimentation destroys habitat, including feeding and spawning areas, and can damage the respiration processes of fish.

Nutrients (especially nitrogen and phosphorous) enter rivers and streams from lawns, golf courses, farms, storm water, animal wastes, urban development and failing septic systems. Excess nutrients cause eutrophication (excessive algal and plant blooms) which clog rivers and streams, and when these plants die, deplete dissolved oxygen in the water important for fish and other forms of aquatic life. In addition, eutrophication may cause taste problems for those who depend on the river for water supply, and odor problems for those who live near or use the river.

Heavy metals (lead, copper, cadmium, zinc, mercury, aluminum and chromium) come from urban runoff, illegal dumping, or poor storage practices. They enter rivers either through storm drain runoff or bonded to sediments in runoff from the land. Heavy metals, such as mercury, have been stored on currently active or abandoned industrial sites. For example, mercury contamination from an old dye plant on the Sudbury River took years to find its way through ground water to wetlands, rivers and streams. Bottom feeding organisms consume the heavy metals with other food, and the heavy metals proceed through the food chain to affect other animals.

Toxics and hazardous materials come from landfills, junkyards, underground storage tanks, inappropriate industrial practices, hazardous waste disposal, septic systems, pesticide applications, poor storage practices, auto maintenance, runoff from highways and parking lots, and marinas. These substances accumulate in sediments or in the water column. Toxics and hazardous wastes accumulate in the food chain.

continues

Nonpoint Source Pollution and River systems (continued)

Pesticides and herbicides from agriculture, lawn care, golf courses, and urban runoff accumulate in sediments. These poisons can kill aquatic organisms, harm water supplies, and increase the risk of public health. Many of these substances are carcinogens.

In 1962, in her book Since Silent Spring, Rachel Carson warned not only about fish kills from pesticides and herbicides, but also of the dangers of mixing many different chemicals together in our rivers and streams. These chemicals form combinations that can be more lethal than the original applications.

Bacteria and viruses from failing septic systems, from farm feed lots and manure piles, from animal wastes, and from storm water runoff degrade water quality and threaten life systems. Recent studies in coarse soils such as found on Cape Cod have shown that viruses travel much further than previously thought. Studies have shown viruses 2 feet--2723 feet from the septic system where they originated. Additional studies are needed to address these problems.

Salt comes from highway department storage, snow removal practices including road maintenance and disposal of salt-laden snow. Accumulations of salt in small streams can harm human health if used as a drinking water source and can harm aquatic organisms and the ecology of the stream. Once salt gets in ground water, sources of drinking water can be destroyed.

Thermal pollution usually refers to an increase in the stream temperature. In addition to water temperature increases from wastewater treatment plant discharges, thermal pollution can also occur because of construction, mining and gravel operations, urban runoff and hydrological changes. For example, the large expanses of parking lots and roofs from a shopping center can heat rain water; the first flush of this heated water can change the temperature of a stream.

Thermal pollution harms fisheries and sometimes causes a transition from cold water to warm water fisheries. It also can reduce the amount of dissolved oxygen in the stream, cause odors, increase the conditions for pathogens and bacteria growth, and encourage nuisance vegetation.

(For more information about Nonpoint Source Pollution and Best Management Practices can be found in DEPs new Mega-Manual (Massachusetts Nonpoint Source Management Manual: A Guidance Document for Massachusetts Officials) which was distributed to all cities and towns in August, 1993.)

For more information about stream protection, see the Adopt-A-Stream Workbook: How to Protect Your River, Stream or Brook, which gives step by step suggestions for community groups to use in protecting local resources.